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# Info

# Working Trees

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## Mitigating Heat Stress in Cattle

### What causes heat stress?

Heat stress in cattle causes a reduction in feed intake, weight gains, milk production and breeding efficiency. Ideal conditions for beef and dairy cattle include a temperature range between 41° and 77° F. Higher temperatures begin to cause stress in cattle, depending on environmental factors such as shade, access to water, relative humidity, diet, surrounding vegetation and terrain.



Livestock crowd together in the shade of a lone tree. -NAC Photo

There are also internal physiological issues that contribute to heat stress. For example, greater amounts of fat in heavier cattle cause them to suffer from heat stress more and, similarly, lactating cattle have more internal heat to dissipate than non-lactating animals. Some forage plants such as tall fescue and perennial ryegrass can be endophyte infected, producing alkaloids that raise deep body temperature in cattle. All of these factors contribute to heat stress.

Heat stress can even result in greater calf mortality and increased veterinary costs. Moreover, it causes livestock to drink more water, and lose more sodium, magnesium, and potassium in their urine.

### Management strategies for coping with heat

Shade and water for cattle is paramount! Therefore, management strategies must include provision of shade, providing adequate water, improving ventilation in barns, providing more high quality forage and reducing work necessary to access food, mineral and water. Livestock shading can be employed with trees, buildings, or portable structures, but cattle generally prefer natural shade. Trees on the grazing landscape usually have an advantage over barns and temporary structures because of the cooling effect that evapotranspiration provides, better ventilation and reduced reflection of sunlight rays. When producers are unable to manage grazing through rotational systems, block plantings of trees protected with fencing will provide shade on the north and east sides of the planting. However, producers that employ rotationally grazed systems with silvopasture achieve maximum benefits. Silvopastures provide shade throughout the pasture which benefits the cattle whether walking, loafing or grazing. An ample supply of water is another important tool for coping with heat. A rise in the ambient temperature from 70° to 90° F results in a 38% increase in drinking water requirements for beef cattle. Whether utilizing block plantings of trees or silvopastures, it is also important to provide continuously available mineral supplements and salt. In rotationally grazed silvopastures, moving livestock to new pastures more frequently will provide higher quality forages. Better quality forage requires less fermentation, which can result in reduced rumen heat.

## Do cattle really benefit from shade?

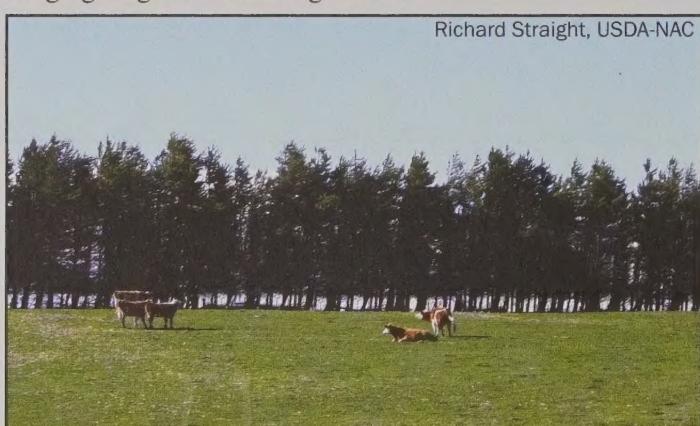
Yes. The two most important facets of relieving heat stress are: 1) limiting the solar radiation that cattle receive and, 2) providing ample water. Beef cattle research in Kentucky demonstrated a reduction in deep body temperature as much as 1.4 degree F, with improvement in daily gains as high as 1.25 pounds per day during summer heat stress periods. Shade also helps improve milk yields in dairy cattle. Shade is particularly important when it comes to cutting back the heat load resulting from direct sun rays, particularly in cattle with dull, dark hair coats. Sun rays reflected from the ground also contribute to heat stress. Ground cover and the orientation of the shading probably have the greatest effect on reflected rays. For example, cattle grazing in a silvopasture or relaxing beside a block planting of trees in a lush pasture would experience greater relief from reflected rays than cattle in a dry lot with only an overhead shade structure.

### What options exist for providing shade?



Jim Robinson, USDA-NRCS

**Silvopasture** - Cattle usually prefer natural shade to artificial shade structures. Evenly distributed shade helps avoid cattle congregating and over using one site.



Richard Straight, USDA-NAC

**Block Planting of Trees** - Trees effectively block direct and some of the reflected sun rays. Also, the nearby air may be cooled slightly by evapotranspiration.

*Author: Sid Brantly, Grazing Land Specialist, Kentucky NRCS*

### More information on the Web

USDA National Agroforestry Center: <http://nac.unl.edu/documents/agroforestrynotes/an29s07.pdf>

Association for Temperate Agroforestry (AFTA): [http://www.aftaweb.org/cattle\\_benefit\\_shade.php](http://www.aftaweb.org/cattle_benefit_shade.php)

University of Kentucky - College of Agriculture: [www.ca.uky.edu/agc/pubs/aen/aen99/aen99.pdf](http://www.ca.uky.edu/agc/pubs/aen/aen99/aen99.pdf)

Ohio State University Extension: <http://beef.osu.edu/beef/beefJly26.html>

Contact: USDA National Agroforestry Center, 402.437.5178 ext. 4011; fax 402.437.5712; 1945 N. 38th St., Lincoln, Nebraska 68583-0822. <http://nac.unl.edu/>

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